TECHNICAL REPORT

IEC TR 61010-3-081

First edition
2003-04

Safety requirements for electrical equipment for measurement, control, and laboratory use –

Part 3-081: Conformity verification report for IEC 61010-2-081:2001 – Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

Règles de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire –

Partie 3-081: Rapport de vérification de la conformité de la CEI 61010-2-081:2001 – Prescriptions particulières pour appareils de laboratoire, automatiques et semi-automatiques, destinés à l'analyse et autres usages

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 3–081: Conformity verification report for IEC 61010–2–081:2001 Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example “state of the art”.

IEC 61010-3-081, which is a technical report, has been prepared by IEC technical committee 66: Safety of measuring, control, and laboratory equipment.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
66/277/DTR	66/315 /RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the IEC/ISO Directives, Part 2.

This report is a Technical Report and is of a purely informative nature and is therefore by itself not to be regarded as an International Standard. It is to assist users of the standard with determining and recording verification of conformity of the equipment under test with the requirements of:

IEC 61010–2–081: 2001

The protocol for completion of this report is contained in publication IEC 61010-3:2003 (2nd edition).

The IEC sells read-only PDF files as a general rule. In the present instance, and quite exceptionally, to enable the user to fill in the forms, a revisable file is included in a pocket affixed to the back cover of this publication.

This file can also be downloaded from the Web as a PDF file. There is, however, at the end of the document, a revisable file containing the forms. Please use the zip/unzip function.

WARNING – Experience has shown that if a version is downloaded in Word 97or Word 2000 and is subsequently converted to Word 6, some of the symbols may have been incorrectly changed in the conversion. Care must, therefore, be taken to verify the symbols used in the converted document.

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

TEST REPORT **IEC 61010–2–081** **Safety requirements for electrical equipment for measurement, control, and laboratory use** **Part 2–081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes**	
Report Reference No. ..... : Tested by (name and signature). : Approved by (name and signature) ..... : Date of issue ..... : Contents ..... : Pages	
Testing organisation ..... : Address ..... : Testing location ..... :	
Applicant's name ..... : Address ..... :	
Test specification: Standard ..... : IEC 61010-2-081:2001 and IEC 61010 – 1 : 2001 (2nd Edition) Copyright blank test report..... .....: This report has been prepared by IEC TC 66, which retains responsibility for any changes or corrections required. Test Procedure.....: Procedure deviation.....: Non-standard test method.....:	
Test item description ..... :	
Trademark ..... :	
Model/Type reference ..... :	
Rating(s) ..... :	

Test item particulars..... :	
Type of item tested .....:	Measurement / Control / Laboratory
Description of equipment function ..... :	
Intended use.....:	
INSTALLATION/OVERVOLTAGE CATEGORY..... :	
POLLUTION DEGREE ..... :	
Environmental rating ..... :	standard / extended (specify):
Equipment mobility..... :	portable / hand-held / floorstanding / fixed / built in/
Connection to mains supply..... :	Permanent / detachable cord set / non detachable cord set / none
Operating conditions ..... :	continuous / short-time / intermittent
Overall size of the equipment (L x W x H) ..... :	
Mass of the equipment (kg) ..... :	
Marked degree of protection to IEC 60529..... :	IP_____ _____
Accessories and detachable parts included in the evaluation..... :	
Options included.....:	
Test case verdicts:	
Test case does not apply to the test object.....:	N/A
Test object does meet the requirement.....:	P(Pass)
Test object does not meet the requirement .....:	F(Fail)

General remarks:

The test results presented in this report relate only to the item(s) tested.

"(see remark #)" refers to a remark appended to the report.
"(see Annex #)" refers to an annex appended to the report.

"(see Form A.#)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

Copy of equipment markings:

Summary of test results (information/comments):

TABLE: 1 - Documents reviewed					
Document Name	**Version**	**Date**	**Editor**	**Attached Yes / No**	**Page Numbers**

TABLE: 2 - Test equipment list

Test equipment number	Type and make	Unique identification number	Calibration date		Ranges used	Comments
			Last	Due		
			note 1		note 2	

Note 1 Or interval between calibrations
Note 2 Range used may be noted using the Instrument Code on the specific Form

TABLE: 3 - List of components and circuits relied on for safety					
Unique component reference or location (including drawing reference if required)	**Safety Function**	**Manufacturer** (note 1)	**Part number**	**RATING** (note 2)	**Evidence of acceptance** (note 3)
NOTE 1 - List all manufacturers concerned. NOTE 2 - Electrical, mechanical, flammability, etc. NOTE 3 - Licence number, file number or other documentary evidence of acceptance					

Clause	Requirement – Test	Result - Remarks	Verdict
5	**MARKING AND DOCUMENTATION**		
5.1.1	**General**		
	Required equipment markings are:		
	visible:		
	From the exterior; or		
	After removing a cover; or		
	Opening a door		
	After removal from a rack or panel		
	Not put on parts which can be removed by an OPERATOR		
	Letter symbols (IEC 60027) used		
	Graphic symbols (IEC 61010-1: Table 1) used		
	Additional symbols cannot be confused with the international ones		
5.1.2	**Identification**		
	Equipment is identified by:		
5.1.2a)	Manufacturer's or supplier's name or trademark		
5.1.2b)	Model number, name or other means		
	Manufacturing location identified		
5.1.3	**Mains supply**		
	Equipment is marked as follows:		
5.1.3a)	Nature of supply:		
	1) A.C. RATED mains frequency or range . of frequencies .....:		
	2) D.C. with symbol 1		
5.1.3b)	RATED supply voltage(s) or range .....:		
5.1.3c)	Max. RATED power (W or VA)or input current.....:		
	The measured value not more than 110 %	(See Form A.3)	
	If more than one voltage range:		
	Separate values marked; or		
	Values differ by less than 20 %	(See Form A.3)	
5.1.3d)	OPERATOR-set for different RATED supply voltages:		
	Indicates the equipment set voltage		
	PORTABLE EQUIPMENT indication is visible from the exterior		
	Changing the setting changes the indication		
5.1.3e)	Accessory mains socket-outlets accepting standard mains plugs are marked:		
	With the voltage if it is different from the mains supply voltage .....:		
	For use only with specific equipment		
	If not marked for specific equipment it is marked with:		
	The maximum RATED current or power; or		
	Symbol 14 with full details in the documentation		

Clause	Requirement – Test	Result - Remarks	Verdict
5.1.4	**Fuses**		
	OPERATOR replaceable fuse marking (see also 5.4.5) .....:		
5.1.5	**TERMINALS, connections and operating devices**		
	Where necessary for safety, indication of purpose of TERMINALS, connectors, controls and indicators marked		
	If insufficient space, symbol 14 used		
5.1.5.1	**TERMINALS**		
	Mains supply TERMINALS identified		
	Other TERMINAL marking :		
5.1.5.1a)	FUNCTIONAL EARTH TERMINALS (symbol 5 used)		
5.1.5.1b)	PROTECTIVE CONDUCTOR TERMINALS:		
	Symbol 6 is placed close to or on the TERMINAL; or		
	Part of appliance inlet		
5.1.5.1c)	TERMINALS of measuring and control circuits (symbol 7 used)		
5.1.5.1d)	HAZARDOUS LIVE TERMINALS supplied from the interior		
	Standard MAINS socket outlet; or		
	RATINGS marked; or		
	Symbol 14 used		
5.1.5.1e)	ACCESSIBLE FUNCTIONAL EARTH TERMINALS:		
	Self-evident; or		
	Indication (symbol 8 acceptable)		
5.1.5.2	**Measuring circuit TERMINALS**		
	For TERMINALS other than those permanently connected and not ACCESSIBLE:		
	RATED voltage or current marked		
	Unless clear indication that below limits:		
	Maximum RATED voltage to earth is marked; or		
	For specific connection to other equipment TERMINALS only, and means for identifying provided		
	Appropriate measurement category marked (CAT II, CAT III or CAT IV); or		
	No measurement category marked (CAT I)		
	Required markings are adjacent to TERMINALS; OR		
	If insufficient space:		
	On the RATING plate or scale plate; or		
	TERMINAL is marked with symbol 14		
5.1.5.101	**Gas and liquid connections**		
	The equipment is clearly marked near to the connector on the equipment with:		
5.1.5.101a)	A means of identifying the gas or liquid to be used; or		
	Symbol 14 of Table 1		
5.1.5.101b)	The maximum permitted pressure or alternatively symbol 14 of Table 1 (see 5.4.3)		

Clause	Requirement – Test	Result - Remarks	Verdict
5.1.6	**Switches and circuit breakers**		
	If disconnecting device, on or off position marked		
5.1.7	**Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION**		
	Protected throughout (symbol 11 used)		
	Only partially protected (symbol 11 not used)		
5.1.8	**Field-wiring TERMINAL boxes**		
	If TERMINAL or ENCLOSURE exceeds 60 °C:	(See 10.3a))	
	Cable temperature RATING marked		
	Marking visible or beside TERMINAL		
5.2	**Warning markings**		
	Visible when ready for NORMAL USE		
	Are near or on applicable parts		
	Symbols and text correct dimensions and colour		
	If necessary marked with symbol 14		
	Statement to isolate or disconnect		
	Equipment that can be potentially infectious marked with symbol 101 of Table 1		
	Use of chemical substances, symbol 14 of Table 1		
	Protective covers marked to warn the OPERATOR not to open or remove them except as permitted by 7.2.101 or 7.2.102		
	Parts of the equipment that contain biohazardous waste material marked with symbol 101 of Table 1		
5.3	**Durability of markings**		
	Resists the effects of temperature and rubbing, and of solvent and reagents likely to be encountered in NORMAL USE	(See Form A.4)	
5.4	**Documentation**		
5.4.1	**General**		
	Equipment is accompanied by documentation which includes:	(For documents see Table 1)	
5.4.1a)	Intended use		
5.4.1b)	Technical specification		
5.4.1c)	Instructions for use		
5.4.1d)	Name and address of manufacturer or supplier		
5.4.1e)	Information specified in 5.4.2 to 5.4.5		
5.4.1f)	If marking of TERMINALS required, definition of measurement category		
5.4.1g)	If CAT 1:		
	Warning		
	RATINGS		
	Warning statements and a clear explanation of warning symbols:		
	Provided in the documentation; or		
	Information is marked on the equipment		
	Information about any RISKS not reduced to a TOLERABLE RISK level		

Clause	Requirement – Test	Result - Remarks	Verdict
	Information included in documentation on:		
	Training; or		
	Protective devices; or		
	Personal protective equipment to reduce RISKS to a TOLERABLE RISK level specified		
5.4.2	**Equipment RATINGS**		
	Documentation includes:		
5.4.2a)	Supply voltage or voltage range		
	Frequency or frequency range		
	Power or current RATING		
5.4.2b)	Description of all input and output connections		
5.4.2c)	RATING of insulation of external circuits, when such circuits are nowhere ACCESSIBLE		
5.4.2d)	Statement of the range of environmental conditions		
5.4.2e)	Degree of protection (IEC 60529)		
5.4.3	**Equipment transportation, installation and assembly instructions**		
	Documentation for the RESPONSIBLE BODY includes:		
5.4.3a)	Instructions for transportation after delivery to the RESPONSIBLE BODY		
5.4.3b)	Floor loading requirements		
5.4.3c)	Individual weights of principal heavy subassemblies		
5.4.3d)	Location and mounting instructions		
5.4.3e)	Assembly instructions		
5.4.3f)	Instructions for protective earthing		
5.4.3g)	The sound data required by 12.5.1		
5.4.3h)	Instructions relating to the handling, containment and exhaust of hazardous substances		
5.4.3i)	Any drainage systems required		
5.4.3j)	Details of protective measures relating to hazardous radiation		
5.4.3k)	Instructions for connections to the supply		
5.4.3l)	For PERMANENTLY CONNECTED EQUIPMENT only:		
	1) MAINS supply requirements and details of connections		
	2) If external switch or circuit breaker, requirements and location recommendation		
5.4.3m)	Requirements for special services		
5.4.4	**Equipment operation**		
	Instructions for use include:		
5.4.4a)	Details of operating controls		
5.4.4b)	Positioning for disconnection		
5.4.4c)	Interconnection		
5.4.4d)	Specification of intermittent operation limits		
5.4.4e)	Explanation of symbols used		
5.4.4f)	Instructions for any actions to be taken by an OPERATOR in case of a malfunction		
5.4.4g)	Cleaning and decontamination (see 11.2)		

Clause	Requirement – Test	Result - Remarks	Verdict
5.4.4h)	Disposal of waste		
5.4.4i)	Need for training or personal protection measures		
5.4.4j)	The need to use protective gloves		
5.4.4k)	Instructions for protection of the mouth, nose or eyes		
5.4.4l)	Requirements for protective devices		
5.4.4m)	Instructions relating to access to moving parts		
	A statement about protection impairment if used in a manner not specified by the manufacturer		
5.4.5	**Equipment maintenance**		
	Instructions include:		
	Sufficient preventive maintenance and inspection information		
	Replacement of hoses, etc.		
	Specific battery type		
	Any manufacturer specified parts		
	RATING and characteristics of fuses		
5.4.101	**REMOVAL OF EQUIPMENT FROM USE FOR REPAIR OR DISPOSAL**		
	Instructions regarding eliminating or reducing HAZARDS provided		
6	**PROTECTION AGAINST ELECTRIC SHOCK**	(See Form A.5)	
6.1	**General**		
6.1.1	**Requirements**		
	ACCESSIBLE parts not HAZADOUS LIVE in NORMAL CONDITION and SINGLE FAULT CONDITION		
	Conformity is checked by the determination of 6.2 and 6.3 followed by the tests of 6.4 to 6.11		
6.1.2	**Exceptions**		
	Capacitance test	(See Forms A.6 and A.7)	
	Parts not HAZARDOUS LIVE 10 s after interruption of supply		
6.2	**Determination of ACCESSIBLE parts**	(See Form A.6)	
6.2.1	**General examination**		
6.2.2	**Openings above parts that are HAZARDOUS LIVE**		
6.2.3	**Openings for pre-set controls**		
6.3	**Permissible limits for ACCESSIBLE parts**		
6.3.1	**Values in NORMAL CONDITION**	(see Form A.7)	
6.3.2	**Values in SINGLE FAULT CONDITION**	(See Form A.8)	
6.4	**Protection in NORMAL CONDITION (see 6.2, 6.3.1, 6.7, 6.8 and 8.1)**		
6.5	**Protection in SINGLE FAULT CONDITION**		
	Additional protection is provided by:		
	One or more of 6.5.1 to 6.5.3; or		
	Automatic disconnection of the supply (6.5.4)		
6.5.1	**Protective BONDING**		
	ACCESSIBLE conductive parts:		
	Separated by DOUBLE INSULATION or REINFORCED INSULATION; or		

Clause	Requirement – Test	Result - Remarks	Verdict
	Bonded to the PROTECTIVE CONDUCTOR TERMINAL; or		
	Separated by screen or BARRIER bonded to PROTECTIVE CONDUCTOR TERMINAL from parts which are HAZARDOUS LIVE		
6.5.1.1	**Integrity of PROTECTIVE BONDING**		
6.5.1.1a)	PROTECTIVE BONDING consists of directly connected structural parts or discrete conductors or both; and withstands thermal and dynamic stresses		
6.5.1.1b)	Soldered connections:		
	Independently secured		
	Not used for other purposes		
	Screw connections are secured		
6.5.1.1c)	PROTECTIVE BONDING not interrupted		
6.5.1.1d)	Any moveable connection specifically designed, and meets 6.5.1.3		
6.5.1.1e)	No external metal braid of cables used		
6.5.1.1f)	If MAINS supply passes through:		
	Means provided for passing protective conductor;		
	Impedance meets 6.5.1.3.		
6.5.1.1g)	Protective conductors bare or insulated, if insulated, green/yellow		
	Exceptions:		
	1) earthing braids;		
	2) internal protective conductors etc.;		
	Green/yellow not used for other purposes		
6.5.1.1h)	TERMINAL suitable, and meets 6.5.1.2		
6.5.1.2	**PROTECTIVE CONDUCTOR TERMINAL**		
6.5.1.2a)	Contact surfaces are metal		
6.5.1.2b)	Appliance inlet used		
6.5.1.2c)	For rewireable cords and PERMANENTLY CONNECTED EQUIPMENT, PROTECTIVE CONDUCTOR TERMINAL is close to MAINS supply TERMINALS		
6.5.1.2d)	If no MAINS supply is required, any PROTECTIVE CONDUCTOR TERMINAL:		
	Is near TERMINALS of circuit for which protective earthing is necessary		
	External if other TERMINALS external		
6.5.1.2e)	Equivalent current-carrying capacity to MAINS supply TERMINALS		
6.5.1.2f)	If plug-in, makes first and breaks last		
6.5.1.2g)	If also used for other bonding purposes, protective conductor:		
	Applied first;		
	Secured independently;		
	Unlikely to be removed by servicing; or		
	Warning marking requires replacement of protective conductor		
6.5.1.2h)	Protective conductor of measuring circuit:		
	1) Current RATING;		

Clause	Requirement – Test	Result - Remarks	Verdict
	2) PROTECTIVE BONDING:		
	Not interrupted; or		
	Indirect bonding used (see 6.5.1.5)		
6.5.1.2i)	FUNCTIONAL EARTH TERMINALS allow independent connection		
6.5.1.2j)	If a binding screw:		
	Suitable size for bond wire		
	Not smaller than M 4 (No. 6)		
	At least 3 turns of screw engaged		
	Contact pressure not capable of reduction by deformation of materials		
	Passes tightening torque test	(See Form A.9)	
6.5.1.3	**Impedance of PROTECTIVE BONDING of plug-connected equipment**	(See Form A.10)	
6.5.1.4	**Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT**	(See Form A.10)	
6.5.1.5	**Indirect bonding for measuring and test equipment**	(See Form A.11)	
6.5.2	**DOUBLE INSULATION and REINFORCED INSULATION (see 6.7, 6.8 and 6.9.2)**		
6.5.3	**PROTECTIVE IMPEDANCE**	(See Form A.12)	
6.5.3a)	HIGH-INTEGRITY single component used (s. 14.6); or		
6.5.3b)	A combination of components used; or		
6.5.3c)	A combination of BASIC INSULATION and current- or voltage-limiting device used		
	Components, wires and connections are RATED as required		
6.5.4	**Automatic disconnection of the supply**		
	If used, it meets :		
6.5.4a)	Supplied with the equipment; or		
	Specified by installation instruction		
6.5.4b)	RATED disconnecting time within limit specified		
6.5.4c)	RATED for maximum RATED LOAD		
6.6	**Connections to external circuits**		
6.6.1	**General**		
	Connections do not cause ACCESSIBLE parts of the following to become HAZARDOUS LIVE in NORMAL CONDITION or SINGLE FAULT CONDITION:		
6.6.1a)	The external circuits		
6.6.1b)	The equipment		
	Separation of circuits provided; or		
	Short circuit of separation does not cause a HAZARD		
	Instructions or markings include:		—
	1) RATED conditions for TERMINAL		
	2) Required RATING of external circuit insulation		
6.6.2	**TERMINALS for external circuits**		

Clause	Requirement – Test	Result - Remarks	Verdict
	TERMINALS which receive a charge from an internal capacitor are not HAZARDOUS LIVE	(See Form A.7)	
	High voltage TERMINALS energized from the interior are:		
	Not ACCESSIBLE or		
	When unmated, no HAZARDOUS LIVE voltage; or		
	marked with symbol 12		
6.6.3	**Circuits with TERMINALS which are HAZARDOUS LIVE**		
	These circuits are:		
	Not connected to ACCESSIBLE conductive parts; or		
	Connected to ACCESSIBLE conductive parts, but are not MAINS CIRCUITS and have one TERMINAL contact at earth potential		
	No ACCESSIBLE conductive parts are HAZARDOUS LIVE		
6.6.4	**ACCESSIBLE TERMINALS for stranded conductors**		
6.6.4a)	No risk of accidental contact because:		
	Located or shielded		
	Self-evident or marked whether connected to ACCESSIBLE conductive parts		
6.6.4b)	ACCESSIBLE TERMINALS will not work loose		
6.7	**CLEARANCES and CREEPAGE DISTANCES**	(See Form A.5 and A.13)	
6.8	**Procedure for dielectric strength tests**	(See Form A.5 and A.14)	
6.9	**Constructional requirements for protection against electric shock**		
6.9.1	**General**		
	If a failure could cause a HAZARD:		
6.9.1a)	Security of wiring connections		
6.9.1b)	Screws securing removable covers		
6.9.1c)	Accidental loosening		
	Easily damaged materials not used		
	Non-impregnated hydroscopic materials not used		
6.9.2	**ENCLOSURES of equipment with DOUBLE INSULATION or REINFORCED INSULATION**		
	ENCLOSURE surrounds all metal parts except for small metal parts which are separated		
	ENCLOSURES or parts made of insulating material		
	Protection for metal ENCLOSURES or parts by:		
6.9.2a)	An insulating coating or BARRIER on the inside; or		
6.9.2b)	CLEARANCES and CREEPAGE DISTANCES cannot be reduced by loosening of parts or wires		
6.9.3	**Over-range indication**		
	Unambiguous		
6.10	**Connection to MAINS supply source and connections between parts of equipment**		
6.10.1	**MAINS supply cords**		
6.10.1a)	RATED for maximum equipment current (see 5.1.3c)		
	Cable complies with IEC 60227 or IEC 60245 or is a certified cord		
6.10.1b)	Heat-resistant if likely to contact hot parts		

Clause	Requirement – Test	Result - Remarks	Verdict
6.10.1c)	Temperature RATING (cord and inlet)		
6.10.1d)	Green/yellow used only for connection to PROTECTIVE CONDUCTOR TERMINALS		
	Detachable cords with IEC 60320 MAINS connectors:		
	Conform to IEC 60799; or		
	Have the current RATING of the MAINS connector		
6.10.2	**Fitting of non-detachable MAINS supply cords**		
	Non-detachable cord protection:		
6.10.2a)	Inlet or bushing smoothly rounded; or		
6.10.2b)	Insulated cord guard protruding ≥ 5D		
	The protective earth conductor is the last to take the strain		
6.10.2	**Cord anchorages:**		
6.10.2a)	Cord is not clamped by direct pressure from a screw		
6.10.2b)	Knots are not used		
6.10.2c)	Cannot push the cord into the equipment to cause a HAZARD		
6.10.2d)	No failure of cord insulation in anchorage with metal parts		
6.10.2e)	compression bushing:		
	Clamps all types and sizes of MAINS cords; and Is suitable for connection to TERMINALS provided; or		
	It is designed for a specified screened MAINS cord		
6.10.2f)	Cord replacement does not cause a HAZARD and method of strain relief is clear		
	Push-pull test	(See Form A.16)	
6.10.3	**Plugs and connectors**		
6.10.3a)	MAINS supply plugs, connectors etc., conform with relevant specifications		
6.10.3b)	If equipment supplied at voltages below 6.3.2.a) or from a sole source:		
	Plugs of supply cords do not fit MAINS sockets above RATED supply voltage		
	MAINS-type plugs used only for connection to MAINS supply		
6.10.3c)	Plug pins which receive a charge from an internal capacitor	(See Form A.7)	
6.10.3d)	Accessory MAINS socket outlets:		
	1) Marking if accepts a standard MAINS plug (see 5.1.3e)		
	2) Input has a protective earth conductor if outlet has earth TERMINAL contact		
6.11	**Disconnection from supply source**		
6.11.1	**General (see 6.11.1.1 to 6.11.2.6)**		
	Disconnects all current carrying conductors		
6.11.1.1	**Exceptions**		
6.11.1.1a)	Equipment supplied by low energy source; or		
6.11.1.1b)	Equipment connected to impedance protected supply; or		
6.11.1.1c)	Equipment constitutes an impedance protected load		
6.11.2	**Requirements according to type of equipment**		

Clause	Requirement – Test	Result - Remarks	Verdict
6.11.2.1	**PERMANENTLY CONNECTED EQUIPMENT and multi-phase equipment**		
	Employs switch or circuit-breaker		
	If switch or circuit-breaker is not part of the equipment, documentation specifies:		
6.11.2.1a)	Switch or circuit-breaker to be included in building installation		
6.11.2.1b)	Location		
6.11.2.1c)	Marking		
6.11.2.2	**Single-phase cord-connected equipment**		
	Equipment is provided with:		
6.11.2.2a)	Switch or circuit-breaker; or		
6.11.2.2b)	Appliance coupler (disconnectable without TOOL); or		
6.11.2.2c)	Separable plug (without locking device)		
6.11.2.3	**HAZARDS arising from function**		
	Emergency switch		
	Emergency switch ≤ 1 m from the moving part		
6.11.3	**Disconnecting devices**		
	Electrically close to the supply		
6.11.3.1	**Switches and circuit-breakers**		
	When used as disconnection device:		
	Meets IEC 60947-1 and IEC 60947-3		
	Marked to indicate function		
	Not incorporated in MAINS cord		
	Does not interrupt protective earth conductor		
	If has other contacts meets separation requirements of 6.6 and 6.7		
6.11.3.2	**Appliance couplers and plugs**		
	Where an appliance coupler or separable plug is used as the disconnecting device (see 6.11.2.2):		
	Readily identifiable and easily reached by the OPERATOR		
	Single-phase PORTABLE EQUIPMENT cord length ≤ 3 m		
	Protective earth conductor connected first and disconnected last		
7	**PROTECTION AGAINST MECHANICAL HAZARDS**		
7.1	**General**		
	Conformity is checked by 7.2 to 7.6		
7.2	**Moving parts**		
	Moving parts not able to crush, etc. (see also 6.11.2.3)		
7.2.101	**Accessibility during NORMAL USE**		
	RISK management has been carried out		
	RISKS are minimized by using RISK management (in the following order of priority):		
7.2.101a)	Protective devices		
7.2.101b)	Protective covers		

Clause	Requirement – Test	Result - Remarks	Verdict
7.2.101c)	Mechanical BARRIERS		
7.2.101d)	Sufficient distance between safe areas and moving parts		
7.2.101e)	Warning signals		
7.2.101f)	Warning markings		
	Measures b) to d) combined with warnings		
	Instructions for OPERATOR, warning and training		
7.2.102	**Accessibility outside NORMAL USE**		
	OPERATOR access permitted if:		
7.2.102a)	Access requires TOOL		
7.2.102b)	Statement about training		
7.2.102c)	Warning markings or symbol 14		
7.3	**Stability**		
	Marking of non-automatic means		
	Conformity tests:		
7.3a)	10° tilt test		
7.3b)	multi-directional force test		
7.3c)	downward force test		
7.4	**Provisions for lifting and carrying**		
	Handles or grips withstand four times weight		
	Equipment >18 kg :		
	Has means for lifting or carrying; or		
	Directions in documentation		
7.5	**Wall mounting**		
	Mounting brackets withstand four times weight		
7.6	**Expelled parts**		
	Equipment contains or limits the energy		
	Protection not removable without the aid of a TOOL		
8	**MECHANICAL RESISTANCE TO SHOCK AND IMPACT**		
	After the tests of 8.1 to 8.2:		
	Voltage tests	(See Form A.14)	
	Inspections:		
8a)	HAZARDOUS LIVE parts not accessible		
8b)	ENCLOSURE shows no cracks (HAZARD)		
8c)	CLEARANCES not less than their permitted values	(See Form A.13)	
8d)	BARRIERS not damaged or loosened		
8e)	No moving parts exposed, except permitted by 7.2		
8f)	No damage which could cause spread of fire		
8.1	**ENCLOSURE rigidity test**	(See Form A.15)	
8.2	**Drop test**	(See Form A.15)	
9	**PROTECTION AGAINST THE SPREAD OF FIRE**		
	Conformity for each source of HAZARD or area of the equipment is checked by one of the following:	(See Form A.17)	
9a)	Fault test of 4.4; or	(See Forms A.1 and A.2)	

Clause	Requirement – Test	Result - Remarks	Verdict
9b)	Application of 9.1 (eliminating or reducing the sources of ignition); or		
9c)	Application of 9.2 (containment of fire within the equipment)		
9.1	**Eliminating or reducing the sources of ignition within the equipment**		
9.1a)	1) Limited-energy circuit (see 9.3); or		
	2) Insulation meets the requirements for BASIC INSULATION; or	(See Form A.5 and A.14)	
	Bridging the insulation does not cause ignition	(See Form A.2)	
9.1b)	Surface temperature of liquids and parts (see 9.4.a)		
9.1c)	No ignition in circuits designed to produce heat	(See Form A.2)	
9.2	**Containment of the fire within the equipment, should it occur**		
9.2a)	Energizing of the equipment is controlled by an OPERATOR held switch		
9.2b)	ENCLOSURE conforms with constructional requirements of 9.2.1; and		
	Requirements of 9.4b) or c) are met		
9.2.1	**Constructional requirements**		
9.2.1a)	Insulated wires have flammability classification FV1 or better	(See Table 3 or Form A.18)	
	Connectors and insulating material have flammability classification FV2 or better	(See Table 3 or Form A.18)	
9.2.1b)	The ENCLOSURE is constructed as follows :	(See Form A.17)	
	1) Bottom constructed with:		
	No openings; or		
	Extent as specified in figure 7; or		
	Baffles as specified in figure 6; or		
	Perforated as specified in table 12; or		
	Metal screen with a mesh		
	2) Sides have no openings as specified in figure 7		
	3) Material of ENCLOSURE and any baffle or flame BARRIER is made of.....:		
	Metal (except magnesium); or		
	Non metallic materials have flammability classification FV1 or better	(See Table 3 or Form A.18)	
	4) ENCLOSURE and any baffle or flame BARRIER have adequate rigidity		
9.3	**Limited-energy circuit**	(See Form A.19)	
9.3a)	Potential not more than 30 r.m.s. and 42.4 V peak, or 60 V d.c.		
9.3b)	Current limited by one of following means:		
	1) Inherently or by impedance; or		
	2) Overcurrent protective device; or		
	3) A regulating network limits also in SINGLE FAULT CONDITION		
9.3c)	Is separated by at least BASIC INSULATION		
	If Overcurrent protective device used:		

Clause	Requirement – Test	Result - Remarks	Verdict
	Fuse or a non adjustable electromechanical device		
9.4	**Requirements for equipment containing or using flammable liquids**		
	Flammable liquids contained in or specified for use with equipment do not cause spread of fire		
	Risk is reduced to a tolerable level :	(See Form A.20)	
9.4a)	The temperature of surface or parts in contact with flammable liquids is 25 °C below fire point	(See 10.3b))	
9.4b)	The quantity of liquid is limited		
9.4c)	Flames are contained within the equipment		
	Detailed instructions for risk-reduction provided		
9.5	**Overcurrent protection**		
	Devices not in the protective conductor		
	Fuses or single-pole circuit-breakers not fitted in neutral (multi-phase)		
9.5.1	**PERMANENTLY CONNECTED EQUIPMENT**		
	Overcurrent device:		
	Fitted within the equipment; or		
	Specified in manufacturer's instructions		
9.5.2	**Other equipment**		
	Protection within the equipment		
10	**EQUIPMENT TEMPERATURE LIMITS AND RESISTANCE TO HEAT**		
10.1	**Surface temperature limits for protection against burns**		
	Easily touched surfaces within the limits	(See Form A.21A)	
	Heated surfaces necessary for functional reasons exceeding specified values:		
	Are recognizable as such by appearance or function; or		
	Are marked with symbol 13		
	Guards are not removable without TOOL		
10.2	**Temperatures of windings**	(See Form A.21B)	
	Limits not exceeded in:		
	NORMAL CONDITION		
	SINGLE FAULT CONDITION		
10.3	**Other temperature measurements**	(See Form A.21A)	
	Following measurements conducted if applicable:		
10.3a)	Value of 60 °C of field-wiring TERMINAL box not exceeded		
10.3b)	Surface of flammable liquids and parts in contact with this liquids		
10.3c)	Surface of non-metallic ENCLOSURES		
10.3d)	Parts made of insulating material supporting parts connected to MAINS supply		
10.3e)	TERMINALS carrying a current more than 0.5 A		
10.4	**Conduct of temperature test**		
10.5	**Resistance to heat**		

Clause	Requirement – Test	Result - Remarks	Verdict
10.5.1	**Integrity of CLEARANCE and CREEPAGE DISTANCES**	(See Form A.13)	
10.5.2	**Non-metallic ENCLOSURES**	(See Forms A.22)	
	After treatment:		
	No HAZARDOUS LIVE parts ACCESSIBLE;		
	Tests of 8.1 and 8.2	(See Form A.13)	
	In case of doubt, tests of 6.8 (without humidity preconditioning)	(See Form A.14)	
10.5.3	**Insulating material**		
10.5.3a)	Parts supporting parts connected to MAINS supply	(See 10.3d))	
10.5.3b)	TERMINALS carrying a current more than 0.5 A	(See 10.3e))	
	In case of doubt, examination of material data		
	If not conclusive:,		
	1) Ball pressure test; or	(See Form A.23)	
	2) Vicat softening test of ISO 306	(See Form A.23)	
11	**PROTECTION AGAINST HAZARDS FROM FLUIDS**		
11.1	**General**		
11.2	**Cleaning**	(See Form A.24)	
11.3	**Spillage**	(See Form A.24)	
	Potentially aggressive substances (such as corrosive, toxic or inflammable liquids) taken into account		
	Potentially aggressive substances compatible with contacted parts of the equipment		
11.4	**Overflow**	(See Form A.24)	
11.5	**Battery electrolyte**		
	Battery electrolyte leakage presents no hazard		
11.6	**Specially protected equipment**	(See Form A.24)	
11.7	**Fluid pressure and leakage**		
11.7.1	**Maximum pressure**		
	Maximum pressure of any part does not exceed P_{RATED}		
11.7.2	**Leakage and rupture at high pressure**	(See Form A.25)	
	Test to IEC 60335 (refrigeration only)		
11.7.3	**Leakage from low-pressure parts**	(See Form A.25)	
11.7.4	**Overpressure safety device**		
	Does not operate in NORMAL USE		
	Meets ISO 4126-1; and		
	It conforms with:		
11.7.4a)	Connected as close as possible to parts intended to be protected		
11.7.4b)	Easy access for inspection, maintenance and repair		
11.7.4c)	Adjustment only with TOOL		
11.7.4d)	No discharge towards person		
11.7.4e)	No HAZARD from deposit of discharged material		
11.7.4f)	Adequate discharge capacity		

Clause	Requirement – Test	Result - Remarks	Verdict
11.7.4g)	No shut-off valve between overpressure safety device and protected parts		
12	**PROTECTION AGAINST RADIATION, INCLUDING LASER SOURCES, AND AGAINST SONIC AND ULTRASONIC PRESSURE**		
12.1	**General**		
	Equipment provides protection		
12.2	**Equipment producing ionizing radiation**		
12.2.1	**Ionizing radiation**	(See Form A.26)	
12.2.2	**Accelerated electrons**		
12.3	**Ultra-violet (UV) radiation**	**(**Conformity test under consideration)	
12.4	**Micro-wave radiation**		
	Power density does not exceed 10 W/m^2 ..... :		
12.5	**Sonic and ultrasonic pressure**		
12.5.1	**Sound level**	(See Form A.27)	
12.5.2	**Ultrasonic pressure**	(See Form A.27)	
12.6	**Laser sources (IEC 60825-1)**		
13	**PROTECTION AGAINST LIBERATED GASES, EXPLOSION AND IMPLOSION**		
13.1	**Poisonous and injurious gases and substances**		
	Dangerous amounts of poisonous or injurious gases or substances not liberated in NORMAL CONDITION or SINGLE FAULT CONDITION	Attach any data/test reports used to demonstrate conformity	
	If potentially hazardous substances are liberated:		
	OPERATOR not to be wetted nor able to inhale quantities likely to be hazardous		
	Protective covers or similar means of protection		
13.2	**Explosion and implosion**		
13.2.1	**Components**		
	Components liable to explode:		
	Pressure release device provided; or		
	Apparatus incorporates OPERATOR protection (see also 7.6)		
	Pressure release device:		
	Discharge without danger		
	Cannot be obstructed		
13.2.2	**Batteries and battery charging**		
	If explosion or fire HAZARD could occur:		
	Protection incorporated in the equipment; or		
	Instructions specify batteries with built-in protection		
	If wrong type of battery used:		
	No HAZARD; or		
	Warning by marking and in instructions		
	Equipment with means to charge rechargeable batteries:		
	Warning against the charging of non-rechargeable batteries; and		

Clause	Requirement – Test	Result - Remarks	Verdict
	Type of rechargeable battery indicated; or		
	Symbol 14 used		
	Battery compartment design, no fire or explosive HAZARD		
	Single component failure	(See Form A.28)	
	Polarity reversal test	(See Form A.28)	
13.2.3	**Implosion of cathode ray tubes**		
	If maximum face dimensions > 160 mm :		
	Intrinsically protected and correctly mounted; or		
	ENCLOSURE provides protection		
	If non-intrinsically protected:		
	Screen not removable without TOOL		
	If glass screen, not in contact with surface of tube		
13.2.4	**Equipment RATED for high pressure**	(See 11.7)	
14	**COMPONENTS**		
14.1	**General**		
	Where safety is involved, components meet relevant requirements	(See Table 3)	
14.2	**Motors**		
14.2.1	**Motor temperatures**		
	Does not present a HAZARD when stopped or prevented f from starting; or	(See Form A.21B)	
	Protected by overtemperature or thermal protection device conform with 14.3		
14.2.2	**Series excitation motors**		
	Connected direct to device, if overspeeding causes a HAZARD		
14.3	**Overtemperature protection devices**	(See Form A.29)	
14.3a)	Reliable function is ensured		
14.3b)	RATED to interrupt maximum current and voltage		
14.3c)	Does not operate in NORMAL USE		
14.4	**Fuse holders**		
	No access to HAZARDOUS LIVE parts		
14.5	**Mains voltage selecting devices**		
	Accidental change not possible		
14.6	**HIGH INTEGRITY components**		
	Used in applicable positions	(See Table 3)	
	Conforms with IEC publications		
	Single electronic device not used		
14.7	**Mains transformers tested outside equipment**	(See Forms A.30 and A.31)	
14.8	**Printed circuit boards**		
	Data shows conformity with FV-1 of IEC 60707 or better; or		
	Test shows conformity with FV-1 of IEC 60707 or better; or	(See Form A.18)	

Clause	Requirement – Test	Result - Remarks	Verdict
	Thin film flexible PCB with limited-energy circuit used		
14.9	**Circuits or components used as transient overvoltage limiting devices**		
	After test, no sign of overload or degradation		
15	**PROTECTION BY INTERLOCKS**		
15.1	**General**		
	Interlocks are designed to remove a hazard before OPERATOR exposed		
15.2	**Prevention of reactivation**		
15.3	**Reliability**		
	Single fault unlikely to occur; or		
	Cannot cause a HAZARD		
16	**TEST AND MEASUREMENT EQUIPMENT**		
16.1	**Current measuring circuits**	(See Form A.32)	
16.2	**Multifunction meters and similar equipment**	(See Form A.33)	
	No HAZARD from:		—
	RATED input voltage combinations		
	Settings of functions		
	Settings of range controls		
ANNEX F	**ROUTINE TESTS**		
	Manufacturer's declaration		

4.4.2	**TABLE: Summary of SINGLE FAULT CONDITIONS**			**Form A.1**
Subclause	**Title**	**Does not apply**	**Carried out**	**Comments**
4.4.2.1	PROTECTIVE IMPEDANCE			
4.4.2.2	Protective conductor			
4.4.2.3	Equipment or parts for short-term or intermittent operation			
4.4.2.4	Motors			
4.4.2.5	Capacitors			
4.4.2.6	Mains transformers Attach drawing of MAINS Txs showing all protective devices (see Forms A.29 and A.30)			
4.4.2.7	Outputs			
4.4.2.8	Equipment for more than one supply			
4.4.2.9	Cooling (see note) – air holes closed – fans stopped – coolant stopped			
4.4.2.10	Heating devices (see note) – timer overridden – temperature controller overridden – loss of cooling liquid – overfilled or empty or both			
4.4.2.11	Insulation between circuits and parts			
4.4.2.12	Interlocks			
List below all SINGLE FAULT CONDITIONS not covered by 4.4.2.1 to 4.4.2.12:				
NOTE – Record surface temperatures of flammable liquids and parts in contact with them in Form A.20A				
Supplementary information: See Form A.2 for details of tests.				

4.4	TABLE: Testing in single FAULT CONDITION – Results				Form A.2
Test subclause	**Fault No.**	**Fault description**	**Td 4.4.3 (note)**	**How was test terminated Comments**	**Meets 4.4.4**
NOTE Td = Test duration in h:min:s Record dielectric strength test on Form A.14 and temperature tests on Form A.20. Record in the comments column for each test whether carried out during or after SINGLE FAULT CONDITION.					

5.1.3c)	TABLE: Mains supply	Form A.3
	Marked rating ..... :	V
	Phase ..... :	
	Frequency ..... :	Hz
	Current ..... :	A
	Power ..... :	W
	Power ..... :	VA

Test No.	Voltage V	Frequency Hz	Current A	Power in W	Power in VA	Comments

NOTE – Measurements are only required for marked ratings.

Supplementary information:

5.3	TABLE: Durability of markings	Form A.4

Marking method (see note)	Test agent
1)	A Water
2)	B Isopropyl alcohol
3)	C Solvents and reagents likely to be used in NORMAL USE(specify)
4)	
5)	D (specify agent)
	E (specify agent)

NOTE – Where applicable include print method, label material, ink or paint type, fixing method, adhesive and surface to which marking is fixed.

Marking location	Marking method (see above)
Identification (5.1.2)	
Mains supply (5.1.3)	
Fuses (5.1.4)	
TERMINALS (5.1.5.1)	
Measuring circuit TERMINALS (5.1.5.2)	
Switches and circuit breakers (5.1.6)	
DOUBLE/REINFORCED equipment (5.1.7)	
Field wiring TERMINAL boxes (5.1.8)	
Warning marking (5.2)	
Battery charging (13.2.2)	

Method	Test agent	Remains legible Verdict	Label loose Verdict	Curled edges Verdict	Comments

6	TABLE: Protection against electric shock - Block diagram of system	Form A.5

POLLUTION degree.....: :

Requirements according to subclauses 6.4 to 6.8 and annex D

Location or description	Required insulation type (note 1)	Maximum working voltage (note 2)	CREEPAGE DISTANCE (note 3)				CLEARANCE (note 3) mm	Test voltage (note 2) V	Comments
			PWB mm	CTI	Other mm	CTI			

NOTE 1 – Type of insulation:
BI = BASIC INSULATION
DI = DOUBLE INSULATION
PI = PROTECTIVE IMPEDANCE
RI = REINFORCED INSULATION
SI = SUPPLEMENTARY INSULATION

NOTE 2 – Types of voltage
Peak impulse test voltage (pulse)
r.m.s.
d.c.
peak

NOTE 3 – POLLUTION degrees, which differ from these, should be shown under "Comments".

Supplementary Information:

6.2	**TABLE: List of ACCESSIBLE parts**		**Form A.6**
6.1.2	**Exceptions**		
6.2	**Determination of accessible parts**		
Item	**Description**	**Determination method (note 5)**	**Exception under 6.1.2 (note 4)**

NOTE 1 – Test fingers and pins are to be applied without force unless a force is specified (see 6.2.1)
NOTE 2 – Special consideration should be given to inadequate insulation and high voltage parts (see 6.2)
NOTE 3 – Parts are considered to be ACCESSIBLE if they could be touched in the absence of any covering which is not considered to provide suitable insulation (see note to paragraph 1 of 6.4).
NOTE 4 – Capacitor test may be required (see Form A.7).
NOTE 5 – The determination methods are: visual; rigid test finger; jointed test finger; pin 3 mm diameter; pin 4 mm diameter.

Supplementary information

6	TABLE: Values in NORMAL CONDITION												Form A.7
6.1.1	Exceptions							11.2 Cleaning and decontamination					
6.3.1	Values in NORMAL CONDITION (see note 1)							11.3 Spillage					
6.6.2	Terminals for external circuit							11.4 Overflow					
6.10.3	Plugs and connections												
Item (see Form A.6)	Voltage			Current				Capacitance		10 s test (note 2)			Comments
	V r.m.s.	V peak	V d.c.	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	µC	mJ	V	µC	mJ	
NOTE 1 – The requirements of 6.3.1 include drying out (if specified). For PERMANENTLY CONNECTED EQUIPMENT, the current values are 1,5 times the specified values. NOTE 2 – A 5 s test is specified in 6.10.3c).													

6.3.2	TABLE: Values in SINGLE FAULT CONDITION											Form A.8
Item	Subclause and	Voltage			Transient (see note)		Current				Capacitance	Comments
(See Form A.6)	fault No. (see Form A.2)	V r.m.s.	V peak	V d.c.	V	s	Test circuit A1/A2/A3	mA r.m.s.	mA peak	mA d.c.	µF (note)	
NOTE – Transient voltages must be below the limits given from Figure 1 and the capacitance below the limits from Figure 2 of IEC 61010-1.												

6.5.1.2	TABLE: PROTECTIVE CONDUCTOR TERMINAL - Tightening torque test		Form A.9
Location	**Size of Screw**	**Tightening torque Nm**	**Verdict**

6.5.1.3	TABLE: Bonding impedance of plug connected equipment			Form A.10
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min V	Calculated resistance (maximum allowed 0,1) Ω	Verdict
Supplementary information:				

6.5.1.4	TABLE: Bonding impedance of PERMANENTLY CONNECTED EQUIPMENT		
ACCESSIBLE part under test	Test current A	Voltage attained after 1 min (maximum 10 V) V	Verdict
Supplementary information:			

6.5.1.5	TABLE: Indirect bonding for measuring and test equipment		Form A.11
ACCESSIBLE part under test	**Voltage attained V**	**Time for voltage to drop to allowable levels s**	**Verdict**
a) Voltage limiting device	–	–	–
Supplementary Information:			
ACCESSIBLE part under test	**Voltage applied V**	**Time for device to trip s**	**Verdict**
b) Voltage-sensitive tripping device	–	–	–
Supplementary Information:			

6.5.3	**TABLE:** PROTECTIVE IMPEDANCE	**Form A.12**
A HIGH INTEGRITY **single component**		
Component	**Location**	**Comments**
A combination of components		
Component	**Location**	**Comments**
A combination of BASIC INSULATION **and a current or voltage limiting device**		
Component	**Location**	**Comments**
Supplementary information:		

6.7	TABLE: CLEARANCES and CREEPAGE DISTANCES												Form A.13
8	Mechanical resistance to shock and impact												
10.5.1	Integrity of CLEARANCES and CREEPAGE DISTANCES												
Location (see Form A.5)	Measured (initial – 6.7)		Verdict	Mechanical tests (note)					Test at max. RATED ambient (10.5.1)	Measured after test (if required)		Verdict	Comments
	CREEPAGE DISTANCE mm	CLEARANCE mm		Applied force (6.7) N	Rigidity (8.1) Static	Rigidity (8.1) Dynamic	Drop (8.2) Normal	Drop (8.2) Hand-held/ Plug-in		CREEPAGE DISTANCE mm	CLEARANCE mm		
NOTE – Refer to Form A.12 for dielectric strength tests following the above tests.													

6.8	**TABLE: Dielectric strength tests**	**Form A.14**
4.4.4.1 b)	**Conformity after application of fault conditions (see note)**	
6.4	**Protection in NORMAL CONDITION**	
6.5.2	**DOUBLE INSULATION and REINFORCED INSULATION**	
6.6.1	**Connections to external circuits**	
6.7.3.1 c)	**CLEARANCE values – General: reduced CLEARANCES for homogeneous construction**	
6.10.2.5	**Fitting of non-detachable MAINS SUPPLY cords**[1]	
8	**Mechanical resistance to shock and impact**	
9.1 a) 2)	**Eliminating or reducing the sources of ignition within the equipment**	
9.3 c)	**Limited-energy circuit**	
11.2	**Cleaning (see note)**	
11.3	**Spillage (see note)**	
11.4	**Overflow (see note)**	
11.6	**Specially protected equipment (see note)**	
NOTE – Record the fault, test or treatment applied before the dielectric strength test		
	Test site altitude..... :	m
	Test voltage correction factor (see Table 10) :	

Location or references from Forms A.2 and A.5	Clause or sub-clause	Humidity Yes/No	Atmos-pheric pressure	Working voltage V	Test voltage r.m.s./peak/d.c V	Comments	Verdict

Supplementary information:

8.1	**ENCLOSURE rigidity test**			**Form A.15**
8.2	**Drop test**			
8.1.1	**Static test**			
Material of ENCLOSURE		**Preparation for the test**	**Comments**	**Verdict**
Plastic / Non-metallic		Operated at an ambient temperature of .....°C for.....h	Reason:	
Location		**–**	–	–
1				
2				
3				
8.1.2	**Dynamic test**			
ENCLOSURE material		**Preparation for the test**	**Comments**	–
Plastic / Non-metallic		Cooled to.....°C	Reason:	
Location		Steel sphere to: top/side/bottom	**–**	–
1				
2				
8.2.1.1	**Corner drop test**			
Dropped on corner		**Raised up to:**	**Comments**	–
1		100 mm / 30°		
2		100 mm / 30 °		
3		100 mm / 30°		
4		100 mm / 30°		
8.2.1.2	**Face drop test**			
Dropped on face		**Raised up to:**	**Comments**	–
1		25 mm /30°		
2		25 mm /30°		
3		25 mm /30°		
4		25 mm /30°		
8.2.2	**HAND -HELD EQUIPMENT and direct plug-in equipment**			
ENCLOSURE material		**Preparation for the test**	**Comments**	–
Plastic / Non-metallic		Cooled to .....°C		
Landed on side / edge / corner				

6.10.2f	TABLE: Cord anchorage					Form A.16
Location	**Mass kg**	**Pull N**	**Verdict**	**Torque Nm**	**Verdict**	**Comment**
Supplementary information:						

9	TABLE: Protection against the spread of fire			Form A.17
Item	**Source of HAZARD or area of the equipment considered (circuit, component, liquid etc.)**	**Protection Method (9a, 9b or 9c)**	**Protection details**	**Verdict**
Supplementary information:				

9.2.1	TABLE: Constructional requirements	Form A.18
14.8	Printed circuit boards	

Material tested ..... :	
Generic name ..... :	
Material manufacturer ..... :	
Type ..... :	
Colour ..... :	
Conditioning details ..... :	

–	–	Sample 1	Sample 2	Sample 3
Thickness of specimen	mm			
Duration of flaming after first Application	s			
Duration of flaming plus glowing After second application	s			
Specimen burns to holding clamp	Yes/No			
Cotton ignited	Yes/No			
Sample result	Pass/Fail			

Supplementary information

9.3	TABLE: Limited-energy circuit						Form A.19
Item	9.3 a)	9.3 b) Current and power limitation			9.3 c)	Verdict	
(see Form A.16)	Maximum potential in circuit voltage r.m.s./d.c. V	Maximum available current A	Maximum available power VA	Overload protection after 120 s A	Circuit separation	Yes/No	Comments
Supplementary information:							

9.4	TABLE: Requirements for equipment containing or using flammable liquids		Form A.20
Type of liquid	**9.4 Flammable liquids**		**Verdict**
	b) quantity	**c) Containment**	
Supplementary information:			

Tested by: _____ Date: _____Test equipment No. (Table 2): _____

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10.	**TABLE: Temperature measurements**	**Form A.21A**
10.1	**Surface temperature limits - NORMAL CONDITION or SINGLE FAULT CONDITION**	
10.2	**Temperature of windings- NORMAL CONDITION or SINGLE FAULT CONDITION**	

NOTE – Use separate forms for NORMAL CONDITION and SINGLE FAULT CONDITION

Operating conditions:			
Frequency.....:	Hz	Test room ambient temperature (t_a) :	°C
Voltage .....:	V	Test duration ..... :	h min

Part / Location	t_m °C	t_c °C	t_{max} °C	**Verdict**	**Comments**

NOTE 1 – t_m = measured temperature.
t_c = t_m corrected (t_m–t_a+ 40 °C or max. RATED ambient).
t_{max} = maximum permitted temperature.
NOTE 2 – See also 14.1 with reference to component operating conditions.
NOTE 3 – Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form. Use additional form if necessary.
NOTE 4 – See Form A.20B for details of winding temperature measurements.

10.2	**TABLE: Temperature of windings** **Resistance method for temperature measurements**	**Form A.21B**
4.4.2.6	**MAINS Transformers**	
14.2.1	**Motor temperatures**	

Operating conditions:								
Frequency.....:	Hz	Test room ambient temperature (t_{a1}/t_{a2}) .....:				/	°C (initial / final)	
Voltage .....:	V	Test duration.....:				h	min	
Part / Designation	**R_{cold} Ω**	**R_{warm} Ω**	**Current A**	**t_r K**	**t_c °C**	**t_{max} °C**	**Verdict**	**Comments**

NOTE 1 – R_{cold} = initial resistance; R_{warm} = final resistance
t_r = temperature rise; t_c = t_r corrected (t_c= t_r - { t_{a2} - t_{a1}} + [40 °C or max RATED ambient])
t_{max} = maximum permitted temperature
NOTE 2 – Indicate insulation class (IEC 60085) under comments (optional).
NOTE 3 – Record values for NORMAL CONDITION and / or SINGLE FAULT CONDITION in this Form use additional form if necessary.

Supplementary information:

Tested by: _____ Date: _____Test equipment No. (Table 2): _____

10.5.2	TABLE: Resistance to heat of non-metallic ENCLOSURES		Form A.22
	Test method used:		
	Non operative treatment.....:	[ ]	
	Empty ENCLOSURE.....:	[ ]	
	Operative treatment.....:	[ ]	
	Temperature during tests .....:		
	ENCLOSURE samples tested were .....:		

Description	Material	Comments	Verdict

Dielectric strength test (6.8) ..... :	V	r.m.s./peak/d.c.

Supplementary information:

10.5.3	TABLE: Insulating materials		Form A.23
10.5.3a)	Ball-pressure test		
	Max. allowed impression diameter..... :	2 mm	

Part	Test temperature °C	Impression Diameter (mm)	Verdict

Supplementary information:

10.5.3b)	Vicat softening test (ISO 306)		

Part	Vicat softening temperature °C	Thickness of sample (mm)	Verdict

Supplementary information:

Tested by: _____ Date: _____Test equipment No. (Table 2): _____

8	**TABLE: Mechanical resistance to shock and impact**	**Form A.24**
11	**Protection against hazards from fluids**	

Voltage tests can be carried out once after performing the tests of clause **8** and clause **11**. However, if voltage tests are carried out separately after each set of tests, two forms can be used.

Location	**Clause 8 tests**				**Clause 11 tests**				**Working voltage**	**Test voltage**	**Verdict**	**Comments**
(see Form A.5)	**Static**	**Dynamic**	**Normal**	**Handheld Plug-in**	**Cleaning (11.2)**	**Spillage (11.3)**	**Overflow (11.4)**	**IEC 60529 (11.6)**	**V**	**V**		

NOTE – Use r.m.s., d.c. or peak to indicate the used test voltage.

11.7.2	TABLE: Leakage and rupture at high pressure	Form A.25

Part	Maximum permissible working pressure MPa	Test pressure MPa	Leakage Yes/No	Burst Yes/No	Comments

Supplementary information:

11.7.3	Leakage from low-pressure parts

Part	Test pressure MPa	Leakage Yes / No	Comments

Supplementary information:

12.2.1	TABLE: Ionizing radiation		Form A 26
Locations tested	**Measured values µSv/h**	**Verdict**	**Comments**
Supplementary information:			

12.5.1	TABLE: Sound level	Form A.27
Locations tested	**Measured values dBA**	**Calculated maximum sound pressure level**
At operator's normal position		
At bystanders' positions	–	–
a)		
b)		
c)		
d)		
e)		
Supplementary information:		

12.5.2	Ultrasonic pressure		
Locations tested	**Measured values**		**Comments**
	dB	**kHz**	
At OPERATOR'S normal position			
At 1 m from the ENCLOSURE	–	–	–
a)			
b)			
c)			
d)			
e)			
NOTE – No limit is specified at present, but a limit of 110 dB above the reference pressure value of 20 μPa is under consideration for applicable frequencies between 20 kHz and 100 kHz.			
Supplementary information:			

13.2.2	**TABLE: Batteries**	**Form A.28**
	Battery load and charging circuit diagram:	

Battery type .....:	
Battery manufacturer/model/catalogue No.....:	
Battery RATINGS .....:	
Reverse polarity instalment test	

Single component failures	**Verdict**	
Component	**Open circuit**	**Short circuit**

Supplementary information:

14.3	TABLE: Overtemperature protection devices	Form A.29

Reliability test

Component	Type (note)	Verdict	Comments

NOTE – SR = self-resetting (200 times)
NSR = non-self-resetting (10 times)
NR = non-resetting (1 time)

Supplementary information:

4.4.2.6	**TABLE: Mains transformer**				**Form A.30**
4.4.2.6.1	**Short circuit**				
14.7.1	**MAINS transformers tested outside equipment**				
Type..... :					
Manufacturer ..... :					
Test in equipment					
Test on bench					
Test repeated inside equipment (see 14.7)					
Optional – Insulation class (IEC 60085) of the lowest RATED winding ..... :					
Winding identification					
Type of Protector for winding (see note 1)					
Elapsed time					
Current, A primary					
secondary					
Winding temperature, °C primary					
(see note 2) secondary					
Tissue paper / cheesecloth OK ? (Pass / Fail)					
Voltage tests (see note 3)					
primary to secondary	_____ V _____				
primary to core	_____ V _____				
secondary to secondary	_____ V _____				
secondary to core	_____ V _____				
Verdict					

NOTE 1 – Primary fuse - PF / ( ) A
Secondary fuse - SF / ( ) A
Overtemperature protection - OP / ( ) °C
Impedance protection - Z

NOTE 2 – Indicate method of measurement TC = with thermocouple
R = resistance method
If resistance method is used, record resistance in cold and warm condition in FormA.20B!.

NOTE 3 – Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use
NB = no breakdown or B = breakdown

Supplementary information:

4.4.2.6	**TABLE: Mains transformer**				**Form A.31**
14.7.2	**Overload tests (for MAINS transformers)**				
Type..... :					
Manufacturer ..... :					
Test in equipment					
Test on bench					
Test repeated inside equipment (see 14.7)					
Optional – Insulation class (IEC 60085) of the lowest RATED winding ..... :					
Winding identification					
Type of Protector for winding (see note 1)					
Elapsed time					
Current, A primary					
secondary					
Winding temperature, °C primary					
(see note 2) secondary					
Tissue paper / cheesecloth OK ? (Pass / Fail)					
Voltage tests (see note 3)					
primary to secondary	_____ V _____				
primary to core	_____ V _____				
secondary to secondary	_____ V _____				
secondary to core	_____ V _____				
Verdict					

NOTE 1 Primary fuse - PF / ( ) A
Secondary fuse - SF / ( ) A
Overtemperature protection - OP / ( ) °C
Impedance protection - Z

NOTE 2 Indicate method of measurement TC = with thermocouple
R = resistance method
If resistance method is used, record resistance in cold and warm condition in FormA.20B!

NOTE 3 Record the voltage applied and the type of voltage (r.m.s. / d.c. / peak) and for results use
NB = no breakdown or B = breakdown

Supplementary information:

16.1	TABLE: Current measuring circuits	Form A.32

These tests are performed with all types and models of current transformers without internal protection, and which are specified by the manufacturer for use with the equipment

a) Current transformers

Type/Model	RATED current A	Test current A	Interrupt Yes / No	Verdict	Comments

Supplementary information:

b) Range changing switches

Type / Model	Maximum rated current of switch A	Cycling test Verdict	Comments

Supplementary information:

16.2	TABLE: Multifunctional meters and similar equipment		Form A. 33
	Function switch position ..... :		
	Maximum RATED voltage applied (V)..... :		
	Measurement category ..... :		
	Test source limit (KVA) ..... :		

Maximum RATED voltage applied (V) :

Measuring TERMINALS	Range	Verdict

Maximum RATED voltage applied (V) :

Measuring TERMINALS	Range	Verdict

Supplementary information:

Annex XX

List of applicable and omitted clauses/subclauses in the test report

If any clauses and subclauses are considered to be not applicable to the equipment under test and are omitted from the test report itself, the following list of contents is to be attached with these omitted clauses and subclauses clearly identified with a line through them. If there are no omitted clauses/subclauses, annex A is not required and need not be attached.
.

Summary of tests

5 Marking and documentation
5.1.1 General
5.1.2 Identification
5.1.3 Mains supply
5.1.4 Fuses
5.1.5 TERMINALS, connections and operating devices
5.1.6 Switches and circuit-breakers
5.1.7 Equipment protected by DOUBLE INSULATION or REINFORCED INSULATION
5.1.8 Field-wiring TERMINAL boxes
5.2 Warning markings
5.3 Durability of markings
5.4 Documentation
5.4.1 General
5.4.2 Equipment RATINGS
5.4.3 Equipment installation
5.4.4 Equipment operation
5.4.5 Equipment maintenance
6 Protection against electric shock
6.1 General
6.1.1 Requirements
6.1.2 Exceptions
6.2 Determination of ACCESSIBLE parts
6.2.1 Examination
6.2.2 Openings above parts that are HAZARDOUS LIVE
6.2.3 Openings for pre-set controls
6.3 Permissible limits for ACCESSIBLE parts
6.3.1 Values in NORMAL CONDITION
6.2.3 Values in SINGLE FAULT CONDITION
6.4 Protection in NORMAL CONDITION
6.5 Protection in SINGLE FAULT CONDITION
6.5.1 PROTECTIVE BONDING
6.5.1.1 Integrity of protective bonding
6.5.1.2 PROTECTIVE CONDUCTOR TERMINAL

Annexes

Forms

A.30
A.31
A.32
A.33

Annex YY

This annex details the changes introduced in the combined document for TR 61010-3-081, to reflect the specific requirements of IEC 61010-2-081

Clause Subclause	Requirement – Test	Result – Remarks	Verdict
5	**MARKING AND DOCUMENTATION**		
5.1.1	**General**		
Addition			
	additional symbols cannot be confused with the international ones		
5.1.5	TERMINALS, non electrical connections, and operating devices		
Additions			
5.1.5.101	**Gas and liquid connections**		
	The equipment is clearly marked near to the connector on the equipment with:		
5.1.5.101a)	a means of identifying the gas or liquid to be used; or		
	symbol 14 of Table 1		
5.1.5.101b)	the maximum permitted pressure, or alternatively symbol 14 of Table 1 (see 5.4.3)		
5.2	**Warning markings**		
Additions			
	Equipment that can be potentially infectious marked with symbol 101 of Table 1		
	Equipment that can be hazardous due to the use of chemical substances marked with the appropriate symbol; or		
	Symbol 14 of Table 1		
	Protective covers marked to warn the OPERATOR not to open or remove them except as permitted by 7.2.101 or 7.2.102		
	Parts of the equipment that contain biohazardous waste material marked with symbol 101 of Table 1		
5.3	**Durability of markings**		
Addition			
	Resist the effects of temperature and rubbing, and of solvent and reagents likely to be encountered in NORMAL USE	(See Form A.4)	
5.4.1	**General**		

Additions			
	Information about any RISKS not reduced to a TOLERABLE RISK level		
	Information included in documentation on:		
	Training; or		
	Protective devices; or		
	Personal protective equipment to reduce RISKS to a TOLERABLE RISK level specified;		
5.4.3	**Replacement title and subclause texts**		
5.4.3	**Equipment transportation, installation and assembly instructions**		
	Documentation for the RESPONSIBLE BODY includes:		
5.4.3.a)	Instructions for transportation after delivery to the RESPONSIBLE BODY		
5.4.3.b)	Floor loading requirements		
5.4.3.c)	Individual weights of principal heavy subassemblies		
5.4.3.d)	Location and mounting instructions		
5.4.3.e)	Assembly instructions		
5.4.3.f)	Instructions for protective earthing		
5.4.3.g)	The sound data required by 12.5.1		
5.4.3.h)	Instructions relating to the handling, containment and exhaust of hazardous substances		
5.4.3.i)	Any drainage systems required		
5.4.3.j)	Details of protective measures relating to hazardous radiation		
5.4.3.k)	Instructions for connections to the supply		
5.4.3.l)	For PERMANENTLY CONNECTED EQUIPMENT only:		
	1) Mains supply requirements and details of connections		
	2) If external switch or circuit breaker, requirements and location recommendation		
5.4.3.m)	Requirements for special services		
5.4.4	**Equipment operation**		
	Instructions for use include:		
Replace items 5.4.4f) to i) by the following items 5.4.4f) to m)			
5.4.4f)	instructions for any actions to be taken by an OPERATOR in case of a malfunction		
5.4.4g)	Cleaning and decontamination (see 11.2)		
5.4.4h)	Disposal of waste		

5.4.4i)	Need for training or personal protection measures		
5.4.4j)	The need to use protective gloves		
5.4.4k)	Instructions for protection of the mouth, nose or eyes		
5.4.4l)	Requirements for protective devices		
5.4.4m)	instructions relating to access to moving parts		
	A statement about protection impairment if used in a manner not specified by the manufacturer		
Addition			
5.4.101	**Removal of equipment from use for repair or disposal**		
	Instructions regarding eliminating or reducing HAZARDS provided		
Additions			
7.2.101	**Accessibility during NORMAL USE**		
	Risk management has been carried out		
	Risks are minimized by using risk management (in the following order of priority):		
7.2.101a)	Protective devices		
7.2.101b)	Protective covers		
7.2.101c)	Mechanical BARRIERS		
7.2.101d)	Sufficient distance between safe areas and moving parts		
7.2.101e)	Warning signals		
7.2.101f)	Warning markings		
	Measure b) to d) combined with warnings		
	Instructions for OPERATOR, warning and training		
7.2.102	**Accessibility outside NORMAL USE**		
	OPERATOR access is permitted if:		
7.2.102a)	Access requires TOOL,		
7.2.102b)	Statement about training,		
7.2.102c)	Warning markings or symbol 14		
11.3	**Spillage**	(See Form A.24)	
Additions			
	Potentially aggressive substances (such as corrosive, toxic or flammable liquids) taken into account		

	Potentially aggressive substances compatible with contacted parts of the equipment		
13.1 Replace the title and text by the following new title and texts			
13.1	**Poisonous and injurious gases and substances**		
	Dangerous amounts of poisonous or injurious gases or substances not liberated in NORMAL CONDITION or in SINGLE FAULT CONDITION	Attach any data/test reports used to demonstrate conformity	
	If potentially hazardous substances are liberated:		
	OPERATOR not be wetted nor able to inhale quantities likely to be hazardous		
	protective covers or similar means of protection		

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Q2 Please tell us in what capacity(ies) you bought the standard *(tick all that apply).* I am the/a:

purchasing agent ❑
librarian ❑
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safety engineer ❑
testing engineer ❑
marketing specialist ❑
other.....

Q3 I work for/in/as a: *(tick all that apply)*

manufacturing ❑
consultant ❑
government ❑
test/certification facility ❑
public utility ❑
education ❑
military ❑
other.....

Q4 This standard will be used for: *(tick all that apply)*

general reference ❑
product research ❑
product design/development ❑
specifications ❑
tenders ❑
quality assessment ❑
certification ❑
technical documentation ❑
thesis ❑
manufacturing ❑
other.....

Q5 This standard meets my needs: *(tick one)*

not at all ❑
nearly ❑
fairly well ❑
exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

standard is out of date ❑
standard is incomplete ❑
standard is too academic ❑
standard is too superficial ❑
title is misleading ❑
I made the wrong choice ❑
other .....

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(1) unacceptable,
(2) below average,
(3) average,
(4) above average,
(5) exceptional,
(6) not applicable

timeliness.....
quality of writing.....
technical contents.....
logic of arrangement of contents .....
tables, charts, graphs, figures.....
other .....

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